

#### **Tier 2 Center Considerations**

- MRE/IT proposal main components
  - u Computing hardware at universities
    - s Tier 2 (3?) centers
  - u Networking
  - u R+D for these
    - s Computing grids
    - s Tier 2 system
- Other components (based on feedback)
  - u Limited core software
  - u Training (?)



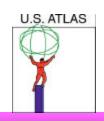
### Possible model for Tier 2's

- Center for specific analyses
  - u Constants for specific application
    - s e.g. alignment, r-t relations
    - s follows hardware commitments
  - u Specific analyses
    - s Full data set of a given trigger
    - s Monte Carlo support
- Try a "bottoms up" approach to scale



### Exercise based on CDF

- Squark/gluino search in missing Et +jets
  - u 2% of overall trigger bandwidth
  - u Multiple passes (full reconstruction) of data
  - u Need for full data information
    - s Development of background rejection
    - s Issues could be developed on a subset?
- Extrapolate equivalent analysis to ATLAS



# Missing Et Exercise

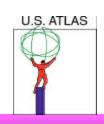
#### • Assume:

- u MET stream is 2% of bandwidth
- u CPU numbers quoted in physics TDR
  - s Substantial variation in tracking time
    - Nearly 3 orders of magnitude variation
    - Take 700 SpecINT95 seconds
- u 1 Mbyte event size
- u 2 years of running at high luminosity



# **CDF/ATLAS**

	CDF I	CDF II	<b>ATLAS</b>
Number of events	3.2M	30M	40M
CPU Tot. Spl95*s	55.4M	900M	28,000M
Data Tot. (Bytes)	100 GBytes	4.2 TBytes	40 TBytes



## **The Details**

	CDF Run I	CDF Run II	ATLAS
CPU time/evt (SpectINT95)	17.3	30	700
Trigger Rate (Hz)	8	75	100
Fraction of Trigger Stream	0.02	0.02	0.02
Event size (Bytes)	3.00E+04	1.40E+05	1.00E+06
Years running	2	2	2
Sec/year	1.00E+07	1.00E+07	1.00E+07
Events Total	3.20E+06	3.00E+07	4.00E+07
Total CPU (SpI95*sec)	5.54E+07	9.00E+08	2.80E+10
Total Data (Bytes)	9.60E+10	4.20E+12	4.00E+13
Fraction of Tier 2 CPU	2.13E-04	3.46E-03	1.08E-01
Fraction of Tier 2 tape	0.10%	4.20%	40.00%
Fraction of Tier 2 disk	0.24%	10.50%	100.00%
Tier 2 CPU (SpI95)	2.60E+04		
Total Available CPU/year	2.60E+11		
Robotic tape capacity	1.00E+14		
Plausible disk capacity	4.00E+13		

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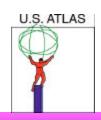


# Tier 2 Capabilities

#### • CPU

u **26,000 SpecINT95** 

u Yearly: 2.6E+11 SpecINT95



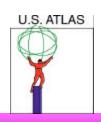
#### Matching of Analysis to Tier 2

- Assumptions:
  - u Full reconstruction pass
  - u Full data set on tape
- 10% of overall CPU usage
- 40% of robotic tape storage
- IF DST compression factor is 1/10
  - u Could have entire sample on disk



## Opinions from exercise

- Model of "delegated" task at at Tier 2 center works
  - u Assume of order 1-2% of trigger load
- Storage capabilities a bit marginal
  - u Improve, using first pass at Tier 1?
  - u Analyze using DST's?



## Other Tier 2 Issues

## Staffing -

- u From Ian, Marjorie: HPSS requires 4 FTE's to staff
- Open question: can one make a <u>requirement</u> that the Tier 2 system be sufficiently automated so that only 1 FTE is required

#### Platforms -

Uniformity: what implications for the sharing of resources within a University/Lab?